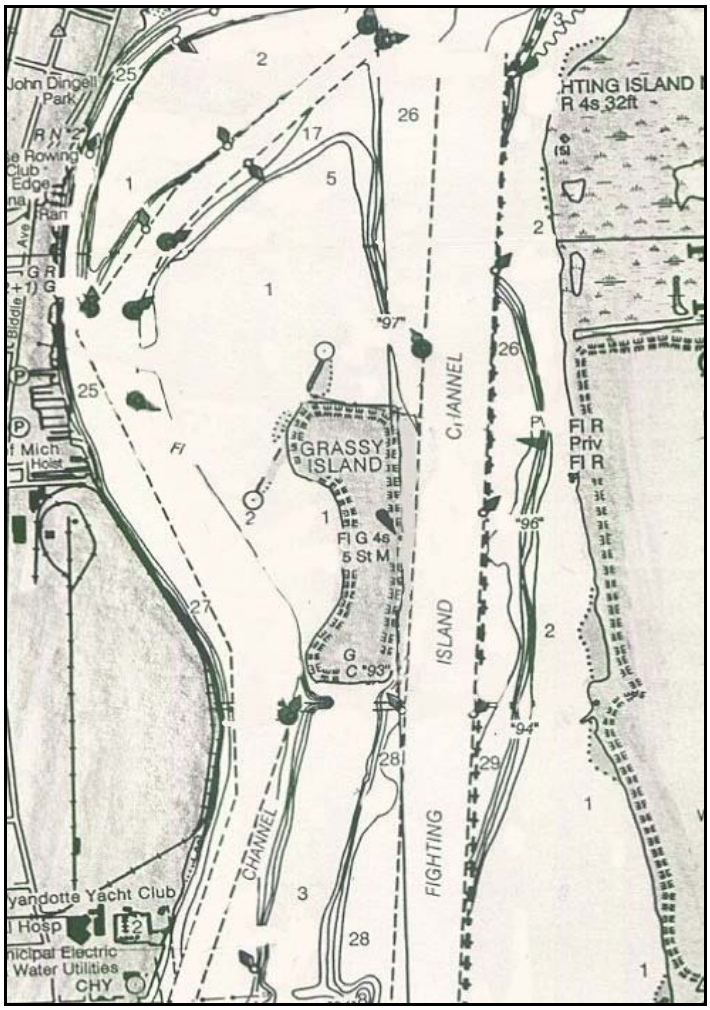
# Fish Community Assessment of Wyandotte National Wildlife Refuge




**July 2001**

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**Fishery Resources Office**
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## INTRODUCTION

Grassy Island is located in the lower Detroit River and is part of the U.S. Fish & Wildlife Service's (Service) Wyandotte National Wildlife Refuge (NWR), which is managed by the Shiawassee NWR. The island refuge includes the contiguous bottomland out to the 1.8-meter contour to protect beds of submerged vegetation, mainly wild celery, *Vallisneria*. The Detroit River surrounding the island supports a native fish community - including lake sturgeon *Acipenser fulvescens*, which are threatened in the state of Michigan (Michigan Department of Natural Resources (MDNR) 1994). Efforts are currently underway by the Service, MDNR, and Central Michigan University to document their abundances and habitats in the river. Lake sturgeon have been documented to spawn ¼ mile north of Grassy Island (Goodyear et al. 1982) and sturgeon may be using areas around the island for nursery habitat. Other threatened or endangered fish species may also be using the nearshore areas of the island for habitat. The channel darter *Percina copelandi*, a Michigan threatened species (MDNR 1994), has been captured in the Detroit River (Latta 1994) near Sugar Island. The area also has a high potential for nuisance exotic species introductions due to the large volume of shipping traffic that passes through the Detroit River waterway to the upper and lower Great Lakes. The round goby *Neogobius melanostomus*, is the most recent of aquatic invasive species that have already been found in the area including the white perch *Morone americana*, alewife *Alosa pseudoharengus*, and zebra mussel *Dreissena polymorpha* (Jude et al. 1995).

The fishery resources of the refuge were documented in 1985 by Haas et al. (1985). The Purposes, Mission, Goals, and Objectives statement for Wyandotte NWR addresses the need to document the fishery resources of Grassy Island prior to any potential loss of species due to invasion by exotic species and to detect the presence of lake sturgeon (Refuge Management Information System 1998). In 2000, the Alpena Fishery Resources Office (FRO) worked with other federal and university partners to document and gather baseline information on the seasonal fish community present in the nearshore waters of the island. The information was provided to refuge managers for use in protection and management of fishery resources. It will also provide additional information on the Detroit River fish community, where many agencies are conducting research. Wyandotte NWR is proposed to be included in the International Wildlife Refuge.

## SITE DESCRIPTION

Grassy Island is located in the lower Detroit River in Wyandotte, Michigan (Wayne County) northwest of Fighting Island. Five locations surrounding the island were sampled seasonally in 2000 (Figure 1). Site 1 was located on the north end of the island. The site ranged in depth from 0.3-1.5 m

and in habitat from shallow cobble shoals and thick vegetative beds to deep boulder riprap along the shoreline. Site 2 was located on the west side of the island in a shallow, wild celery bed. This site ranged in depth from 0.2-0.8 m and was a shallow, sandy depositional area of low flow that was heavily vegetated with a cobble-gravel shoreline. Site 3 was located on the south side of the island along a riprap shore. This site ranged in depth from 0.3-1.0 m and was a low flow shallow depositional area that was vegetated. Site 4 was located on the east side of the island along a riprap shore and the shipping channel. This site ranged in depth from 0.5-2.0 m and was deep with high current flow and a riprap boulder shoreline. Site 5 was located off the south end of the island near channel marker buoys within the 1.8-meter contour managed by the refuge. The site ranged in depth from 1.2-1.8 m and was off shore, deep, and vegetated.

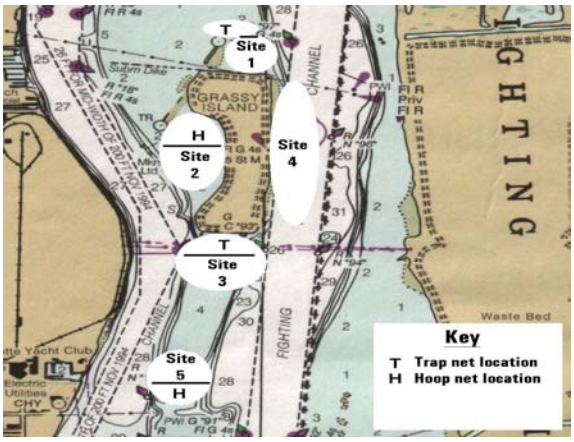


**Figure 1. Grassy Island is located in the Detroit River in Wyandotte, Michigan (Wayne County). Five locations in the nearshore areas of the refuge were sampled in 2000.**

## MATERIALS & METHODS

Sampling was conducted seasonally in May, July, and September. Impoundment gear, trap and hoop nets, was fished at four locations, sites 1-3 and 5. A trap net (1.2 m with 1.3 cm mesh and 25.0 m lead) was fished for 1 night at each of sites 1 and 3, and a hoop net (0.9 m with 1.3 cm mesh and 16.5 m wings) was fished at sites 2 and 5 per season. Boom electrofishing gear was used to sample the shoreline and nearshore fish community at night at each of the four nearshore locations, sites 1-4, surrounding the island. Electrofishing effort ranged from approximately 10-15 minutes per site per season.

All fish were sorted by species. Total lengths (mm) were measured on a representative sample of each species and weights (g) were taken from all sport fish. All fish were released except exotic species. Maximum and minimum water depth (m) and surface water temperature (°C) were measured during each sampling. The catch was examined for each season, each season by gear type, and each site. Biotic data tables were compiled for all sport fish species.

## RESULTS

Baseline fishery data was collected on a total of 1,505 fish from 30 species and 14 families (Table 1) in 11 nights of impoundment gear effort and 140 minutes (2.34 hours) of electrofishing gear effort. The majority of the catch was represented by the Centrarchidae (sunfish) and the Cyprinidae (minnow) families (Figure 2). Rock bass *Ambloplites rupestris* was the most abundant species captured over all and comprised 27% of the total catch, followed by emerald shiner *Notropis atherinoides* and yellow perch *Perca flavescens*, which were both abundant as well and comprised 23% and 10% of the total catch, respectively (Table 1). The largest number of fish (51% of the total catch) and diversity of species (26 species) was captured from refuge waters during the spring sampling in May.

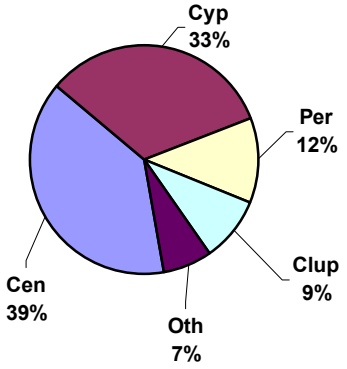


**Figure 2. Total catch represented by family. Other (Oth) represents ten families that comprised 1% or less of the total catch.**

**Cen=Centrarchidae, Cyp=Cyprinidae, Per=Percidae, Clup=Clupeidae, Oth=Other**

**Table 1. Catch from waters of the Wyandotte NWR, Wayne County during sampling in May, July, and September 2000 (all gears combined).**

| Family Name | Species Common Name (Scientific Name) | May | July | Sept. | Total |
|---|---|---|---|---|---|
| AMIIDAE | Bowfin (*Amia calva*) * | 3 | 3 | 1 | 7 |
| ATHERINIDAE | Brook silverside (*Labidesthes sicculus*) | 0 | 0 | 8 | 8 |
| CATOSTOMIDAE | Golden redhorse (*Moxostoma erythrurum*) | 0 | 8 | 0 | 8 |
| | White sucker (*Catostomus commersoni*) | 3 | 0 | 0 | 3 |
| CENTRARCHIDAE | Bluegill (*Lepomis macrochirus*) * | 2 | 11 | 7 | 20 |
| | Pumpkinseed (*Lepomis gibbosus*) * | 6 | 21 | 22 | 49 |
| | Rock bass (*Ambloplites rupestris*) | 238 | 98 | 77 | 413 |
| | Smallmouth bass (*Micropterus dolomieui*) | 27 | 14 | 42 | 83 |
| | Largemouth bass (*Micropterus salmoides*) * | 6 | 3 | 8 | 17 |
| CLUPEIDAE | Alewife (*Alosa pseudoharengus*) | 9 | 0 | 93 | 102 |
| | Gizzard shad (*Dorosoma cepedianum*) | 3 | 11 | 13 | 27 |
| CYPRINIDAE | Bluntnose minnow (*Pimephales notatus*) | 2 | 4 | 16 | 22 |
| | Common carp (*Cyprinus carpio*) * | 21 | 0 | 8 | 29 |
| | Creek chub (*Semotilus atromaculatus*) | 1 | 0 | 7 | 8 |
| | Goldfish (*Carassius auratus*) * | 15 | 3 | 0 | 18 |
| | Emerald shiner (*Notropis atherinoides*) | 311 | 0 | 36 | 347 |
| | Golden shiner (*Notemigonus crysoleucas*) * | 16 | 3 | 13 | 32 |
| | Mimic shiner (*Notropis volucellus*) | 0 | 0 | 13 | 13 |
| | Spotfin shiner (*Notropis spilopterus*) | 3 | 2 | 2 | 7 |
| | Spottail shiner (*Notropis hudsonius*) | 21 | 4 | 3 | 28 |
| ESOCIDAE | Northern pike (*Esox lucius*) * | 2 | 0 | 2 | 4 |
| GOBIIDAE | Round goby (*Neogobius melanostomus*) | 0 | 1 | 7 | 8 |
| ICTALURIDAE | Brown bullhead (*Ameiurus nebulosus*) * | 1 | 3 | 10 | 14 |
| LEPISOSTEIDAE | Longnose gar (*Lepisosteus osseus*) * | 5 | 2 | 0 | 7 |
| OSMERIDAE | Rainbow smelt (*Osmerus mordax*) | 10 | 1 | 0 | 11 |
| PERCICHTHYIDAE | White bass (*Morone chrysops*) | 8 | 0 | 0 | 8 |
| | White perch (*Morone americana*) | 4 | 10 | 0 | 14 |
| PERCIDAE | Yellow perch (*Perca flavescens*) | 40 | 63 | 55 | 158 |
| | Walleye (*Stizostedion vitreum*) | 11 | 3 | 8 | 22 |
| SCIAENIDAE | Freshwater drum (*Aplodinotus grunniens*) | 7 | 10 | 1 | 18 |
| Total Catch | | 775 | 278 | 452 | 1505 |
| Total Species | | 26 | 21 | 23 | 30 |

*Represents fish entirely or largely dependent on aquatic vegetation or marsh habitats (Johnson 1989).

Emerald shiner (40%) and rock bass (31%) comprised the majority of the total catch in May; while rock bass (35%) and yellow perch (23%) were the most abundant species captured in July, and alewife *Alosa pseudoharengus* (21%) and rock bass (17%) were the most abundant species captured in September (Table 1).

One-third of the species captured (13% of the total catch) were species entirely or largely dependent on aquatic vegetation or marsh habitats (Johnson 1989) (Table 1). Site 2 had the largest representation (38% of species captured) and largest abundance (24% of the total catch) of wetland dependent species in comparison to other sites (Table 2).

**Table 2. Site catch comparison for waters of the Wyandotte NWR, Wayne County sampled in May, July, and September 2000.**

| | Site 1 | | | | Site 2 | | | | Site 3 | | | | Site 4 | | | | Site 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Species** | **May** | **July** | **Sept** | **Tot** | **May** | **July** | **Sept** | **Tot** | **May** | **July** | **Sept** | **Tot** | **May** | **July** | **Sept** | **Tot** | **May** | **July** | **Tot** |
| Bowfin* | | 1 | | 1 | 2 | 1 | | 3 | 1 | 1 | 1 | 3 | | | | | | | |
| Brook silverside | | | 1 | 1 | | | 3 | 3 | | | 2 | 2 | | | 2 | 2 | | | |
| Golden redhorse | | 6 | | 6 | | | | | | | | | | 1 | | 1 | | 1 | 1 |
| White sucker | | | | | 1 | | | 1 | | | | | 2 | | | 2 | | | |
| Bluegill* | | 1 | 2 | 3 | 1 | 9 | 5 | 15 | | | | | 1 | 1 | | 2 | | | |
| Pumpkinseed* | 2 | 1 | 17 | 20 | 2 | 13 | 1 | 16 | | 3 | 4 | 7 | 1 | | | 1 | 1 | 4 | 5 |
| Rock bass | 45 | 30 | 43 | 118 | 63 | 24 | 5 | 92 | 55 | 22 | 15 | 92 | 69 | 19 | 14 | 102 | 6 | 3 | 9 |
| Smallmouth bass | 1 | 7 | 3 | 11 | 2 | 3 | 11 | 16 | 4 | 2 | 18 | 24 | 19 | 2 | 10 | 31 | 1 | | 1 |
| Largemouth bass* | | 1 | 5 | 6 | 3 | 1 | 1 | 5 | 3 | | 2 | 5 | | 1 | | 1 | | | |
| Alewife | | | 27 | 27 | | | 18 | 18 | 3 | | 16 | 19 | 5 | | 32 | 37 | 1 | | 1 |
| Gizzard shad | | | 3 | 3 | 3 | 10 | 2 | 15 | | | 2 | 2 | | 1 | 6 | 7 | | | |
| Bluntnose minnow | 1 | 3 | 6 | 10 | | | | | 1 | | 9 | 10 | | 1 | 1 | 2 | | | |
| Common carp* | 2 | | 8 | 10 | 18 | | | 18 | | | | | 1 | | | 1 | | | |
| Creek chub | | | 4 | 4 | | | | | | | 2 | 2 | 1 | | 1 | 2 | | | |
| Goldfish* | | 3 | | 3 | 14 | | | 14 | | | | | 1 | | | 1 | | | |
| Emerald shiner | 46 | | | 46 | 52 | | 9 | 61 | 120 | | 7 | 127 | 93 | | 20 | 113 | | | |
| Golden shiner* | 8 | 3 | 7 | 18 | 1 | | 1 | 2 | 1 | | 5 | 6 | 4 | | | 4 | 2 | | 2 |
| Mimic shiner | | | 9 | 9 | | | 1 | 1 | | | 3 | 3 | | | | | | | |
| Spotfin shiner | | 1 | | 1 | 2 | | | 2 | 1 | 1 | 2 | 4 | | | | | | | |
| Spottail shiner | 12 | 3 | 3 | 18 | 3 | | | 3 | | | | | | 1 | | 1 | 6 | | 6 |
| Northern pike* | 1 | | | 1 | | | 1 | 1 | | | | | 1 | | 1 | 2 | | | |
| Round goby | | | 2 | 2 | | 1 | 1 | 2 | | | 4 | 4 | | | | | | | |
| Brown bullhead* | | 1 | 1 | 2 | | 1 | 2 | 3 | 1 | | 7 | 8 | | | | | | 1 | 1 |
| Longnose gar* | | | | | 5 | 2 | | 7 | | | | | | | | | | | |
| Rainbow smelt | 1 | | | 1 | 1 | | | 1 | 1 | 1 | | 2 | 7 | | | 7 | | | |
| White bass | 7 | | | 7 | | | | | | | | | | | | | 1 | | 1 |
| White perch | | 1 | | 1 | 1 | 3 | | 4 | | 1 | | 1 | | | | | 3 | 5 | 8 |
| Yellow perch | 20 | 21 | 43 | 84 | 15 | 20 | 1 | 36 | 4 | 7 | 8 | 19 | | 1 | 3 | 4 | 1 | 14 | 15 |
| Walleye | 5 | 1 | | 6 | 1 | 1 | 2 | 4 | 2 | | 1 | 3 | 2 | | 5 | 7 | 1 | 1 | 2 |
| Freshwater drum | 5 | 6 | 1 | 12 | 1 | 1 | | 2 | 1 | 2 | | 3 | | | | | | 1 | 1 |
| Total Catch | 156 | 90 | 185 | 431 | 191 | 90 | 64 | 345 | 198 | 40 | 108 | 346 | 207 | 28 | 95 | 330 | 23 | 30 | 53 |
| Total Species | 14 | 17 | 18 | 28 | 20 | 14 | 16 | 26 | 14 | 9 | 18 | 21 | 14 | 9 | 11 | 21 | 10 | 8 | 13 |

*Represents fish entirely or largely dependent on aquatic vegetation or marsh habitats (Johnson 1989).

Site 1 had the greatest diversity of species (28 species) and largest catch, the majority of which was captured in September (Table 2). Sites 2-4 had the greatest catches in May. A breakdown of the catch by site is listed in Table 3. Panfish, bluegill and pumpkinseed, were consistently captured from sites 1 and 2, and rock bass was consistently captured in abundance from all sites. Smallmouth bass were best represented at sites 3 and 4. Walleye *Stizostedion vitreum* were captured from all sites, while yellow perch were best represented at sites 1-3 and 5. Representatives from the minnow family were mainly captured from sites 1-3, as were large predators such as bowfin *Amia calva*, largemouth bass *Micropterus salmoides*, brown bullhead, and longnose gar *Lepisosteus osseus*.

A larger number and greater diversity of species were captured with electrofishing gear than with impoundment gear (Table 3). Seventy-six percent of the total catch representing all fish species were

captured with electrofishing gear, while only 24 % and twenty species were captured with impoundment gear. Some species were captured in higher numbers with impoundment gear than with electrofishing gear - including bluegill *Lepomis macrochirus*, pumpkinseed *Lepomis gibbosus*, brown bullhead *Ictalurus nebulosus*, white perch *Morone americana*, and yellow perch. In general, the mean CPE for all species combined was similar throughout the seasons for impoundment gear (catch per night =2.35, 2.27, and 2.57 respectively); however, the mean CPE for electrofishing gear was higher in May and September than in July (catch per minute= 0.42, 0.39, and 0.21 respectively).

**Table 3. Gear catch comparison for waters of the Wyandotte NWR, Wayne County sampled in May, July, and September 2000.**

| | Impoundment Gear * | | | | | | | Electrofishing Gear** | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | May | | July | | Sept. | | | May | | July | | Sept. | | |
| Species | No. | CPE | No. | CPE | No. | CPE | Total | No. | CPE | No. | CPE | No. | CPE | Total |
| Bowfin | 1 | 0.25 | 1 | 0.25 | 1 | 0.33 | 3 | 2 | 0.03 | 2 | 0.05 | 0 | | 4 |
| Brook silverside | 0 | | 0 | | 0 | | 0 | 0 | | 0 | | 8 | 0.20 | 8 |
| Golden redhorse | 0 | | 2 | 0.50 | 0 | | 2 | 0 | | 6 | 0.15 | 0 | | 6 |
| White sucker | 0 | | 0 | | 0 | | 0 | 3 | 0.05 | 0 | | 0 | | 3 |
| Bluegill | 0 | | 8 | 2.00 | 5 | 1.67 | 13 | 2 | 0.03 | 3 | 0.08 | 2 | 0.05 | 7 |
| Pumpkinseed | 5 | 1.25 | 21 | 5.25 | 20 | 6.67 | 46 | 1 | 0.02 | 0 | | 2 | 0.05 | 3 |
| Rock bass | 69 | 17.25 | 39 | 9.75 | 31 | 10.33 | 139 | 169 | 2.73 | 59 | 1.48 | 46 | 1.15 | 274 |
| Smallmouth bass | 1 | 0.25 | 0 | | 4 | 1.33 | 5 | 26 | 0.42 | 14 | 0.35 | 38 | 0.95 | 78 |
| Largemouth bass | 0 | | 1 | 0.25 | 2 | 0.67 | 3 | 6 | 0.10 | 2 | 0.05 | 6 | 0.15 | 14 |
| Alewife | 1 | 0.25 | 0 | | 2 | 0.67 | 3 | 8 | 0.13 | 0 | | 91 | 2.28 | 99 |
| Gizzard shad | 0 | | 0 | | 0 | | 0 | 3 | 0.05 | 11 | 0.28 | 13 | 0.33 | 27 |
| Bluntnose minnow | 1 | 0.25 | 1 | 0.25 | 2 | 0.67 | 4 | 1 | 0.02 | 3 | 0.08 | 14 | 0.35 | 18 |
| Common carp | 0 | | 0 | | 1 | 0.33 | 1 | 21 | 0.34 | 0 | | 7 | 0.18 | 28 |
| Creek chub | 0 | | 0 | | 0 | | 0 | 1 | 0.02 | 0 | | 7 | 0.18 | 8 |
| Goldfish | 0 | | 3 | 0.75 | 0 | | 3 | 15 | 0.24 | 0 | | 0 | | 15 |
| Emerald shiner | 0 | | 0 | | 0 | | 0 | 311 | 5.02 | 0 | | 36 | 0.90 | 347 |
| Golden shiner | 3 | 0.75 | 0 | | 2 | 0.67 | 5 | 13 | 0.21 | 3 | 0.08 | 11 | 0.28 | 27 |
| Mimic shiner | 0 | | 0 | | 0 | | 0 | 0 | | 0 | | 13 | 0.33 | 13 |
| Spotfin shiner | 0 | | 0 | | 0 | | 0 | 3 | 0.05 | 2 | 0.05 | 2 | 0.05 | 7 |
| Spottail shiner | 9 | 2.25 | 0 | | 0 | | 9 | 12 | 0.19 | 4 | 0.10 | 3 | 0.08 | 19 |
| Northern pike | 0 | | 0 | | 0 | | 0 | 2 | 0.03 | 0 | | 2 | 0.05 | 4 |
| Round goby | 0 | | 1 | 0.25 | 2 | 0.67 | 3 | 0 | | 0 | | 5 | 0.13 | 5 |
| Brown bullhead | 1 | 0.25 | 2 | 0.50 | 7 | 2.33 | 10 | 0 | | 1 | 0.03 | 3 | 0.08 | 4 |
| Longnose gar | 0 | | 0 | | 0 | | 0 | 5 | 0.08 | 2 | 0.05 | 0 | | 7 |
| Rainbow smelt | 0 | | 0 | | 0 | | 0 | 10 | 0.16 | 1 | 0.03 | 0 | | 11 |
| White bass | 1 | 0.25 | 0 | | 0 | | 1 | 7 | 0.11 | 0 | | 0 | | 7 |
| White perch | 3 | 0.75 | 6 | 1.50 | 0 | | 9 | 1 | 0.02 | 4 | 0.10 | 0 | | 5 |
| Yellow perch | 26 | 6.50 | 39 | 9.75 | 28 | 9.33 | 93 | 14 | 0.23 | 24 | 0.60 | 27 | 0.68 | 65 |
| Walleye | 1 | 0.25 | 1 | 0.25 | 1 | 0.33 | 3 | 10 | 0.16 | 2 | 0.05 | 7 | 0.18 | 19 |
| Freshwater drum | 0 | | 2 | 0.50 | 0 | | 2 | 7 | 0.11 | 8 | 0.20 | 1 | 0.03 | 16 |
| Total Catch | 122 | 30.50 | 127 | 31.75 | 108 | 36.00 | 357 | 653 | 10.55 | 151 | 3.81 | 344 | 8.66 | 1148 |
| Mean Catch | 9.38 | 2.35 | 9.07 | 2.27 | 7.71 | 2.57 | 2.40 | 26.12 | 0.42 | 8.39 | 0.21 | 15.64 | 0.39 | 0.34 |
| Total Species | 13 | | 14 | | 14 | | 20 | 25 | | 18 | | 22 | | 30 |

*Impoundment gear CPE= average catch per 1 night set.
** Electrofishing gear CPE= average catch per minute.

Rock bass was the most abundant of the nine sport fish species captured, followed by yellow perch and smallmouth bass (Table 4). Most sport fish species - with the exception of walleye, white bass

*Morone chrysops*, and northern pike *Esox lucius*– may have been using the area as a nursery due to the presence of young-of-the-year fish. However, a variety of year classes were present for most species. See Table 4 for a biotic data summary on sport fish collected during the survey.

**Table 4. Sport fish species captured during surveys on the Wyandotte NWR.**

| Species | Total Catch | Mean Total Length (mm) | Mean Total Weight (g) | Total Length Range (mm) |
|---|---|---|---|---|
| Rock bass | 413 | 152.0 | 97.3 | 50-261 |
| Yellow perch | 158 | 182.8 | 81.5 | 62-297 |
| Smallmouth bass | 83 | 165.1 | 135.7 | 68-440 |
| Pumpkinseed | 49 | 121.0 | 51.6 | 64-177 |
| Walleye | 22 | 443.2 | 802.4 | 305-579 |
| Bluegill | 20 | 107.7 | 31.5 | 60-137 |
| Largemouth bass | 17 | 242.2 | 414.4 | 91-431 |
| White bass | 8 | 401.3 | 860.0 | 365-433 |
| Northern pike | 4 | 629.0* | 980.0* | 629* |

* Information was collected on only 1 fish.

## DISCUSSION

Wyandotte NWR supports a warmwater fish community dominated by members of the sunfish (Centrarchidae) and minnow (Cyprinidae) families. A balanced representation from a variety of guilds was present in the catch. Benthivores, piscivores, and omnivores were abundant. The minnow family dominated the catch in the spring (50% total catch) – mainly due to the abundance of spawning emerald shiner. The sunfish family was most abundant in July (53%), September (35%), and over all (39%).

The island refuge provides a diversity of habitats that are available for fish, from shallow slow water wild celery beds and cobble shoals to deep flowing water shorelines of riprap and boulder. Similarly, the fish community surrounding Grassy Island is relatively diverse. We collected 30 species and a similar study, conducted by Haas *et al*. (1985) off the south end of Grassy Island in 1983 to 1985, found 42 species of fish. Hass *et al.* ranked the Wyandotte site as having the highest in mean CPE and the second highest in total number of species captured of 8 stations spanning the St. Clair and Detroit River systems. Between the two studies, a total of 50 species inhabit or have ranged through the Wyandotte NWR (Table 5). Sixteen of these species (32%) are considered wetland dependent.

The presence of wetland dependent species around Wyandotte NWR indicates that these island systems are providing necessary shallow water habitat, particularly of importance considering the decline in wetland habitat available to fisheries due to development. With the recent donation of Mud Island (located north of Grassy Island) to the Service refuge system, additional habitat will be protected along the Detroit River system.

Although Goodyear et al. (1982) noted that lake sturgeon have spawned in 30 ft of water approximately ¼ mile north of Grassy Island since the 1950's and they have been known to spawn in wave action around rocky islands in the lower Great Lakes (Scott and Crossman 1973), no juvenile or adult lake sturgeon were captured during the survey. However, efforts made by Central Michigan University, MDNR, and the Service from April to October 2000 captured lake sturgeon in the Detroit River near Grassy Island, the closest catch location being the south end of Fighting Island (Tracy Hill, Service, personal communication). Given this information and the fact that areas around Grassy Island provide rocky lake sturgeon spawning habitat, the potential for sturgeon use of the area continues to exist.

No threatened or endangered fish species were captured during sampling in 2000. The last reported sighting of the channel darter from this area of the Detroit River was in 1952 when 11 specimens were recorded near Sugar Island. In Michigan, the channel darter occurs in Lakes Huron and Erie and in large river tributaries and connecting waterways of these Great Lakes. They prefer sand and gravel beaches with slow moving water (Scott and Crossman 1973). Most of the Grassy Island shore is lined with riprap; however the river bed is sandy and may provide adequate habitat when water levels are low; particularly on the western side of the island near survey site 2. Many threatened and endangered species are small darters or cyprinids that possibly may not have been retained in the trap nets used during the study; however, it is likely they may have been captured during night time electrofishing as other cyprinid species were sampled with this gear.

**Table 5. Fish species captured from Wyandotte NWR by Haas et. al in 1983-1985 (*) and in the current study.**

| Common Name | Scientific Name | Common Name | Scientific Name |
|---|---|---|---|
| Longnose gar* | | Quillback carpsucker | *Carpiodes cyprinus* |
| Bowfin* | | Bigmouth buffalo | *Ictiobus cyprinellus* |
| Alewife | | Redhorse, unidentified | |
| Gizzard shad | | Silver redhorse | *Moxostoma anisurum* |
| Rainbow smelt | | Golden redhorse | *Moxostoma erythrurum* |
| Northern pike* | | Shorthead redhorse | *Moxostoma macrolepidotum* |
| Muskellunge* | *Esox masquinongy* | Silver chub | *Hybopsis storeriana* |
| Black bullhead* | *Ictalurus melas* | Spottail shiner | |
| Yellow bullhead* | *Ictalurus natalis* | Rock bass | |
| Brown bullhead* | | Green sunfish* | *Lepomis cyanellus* |
| Channel catfish | *Ictalurus punctatus* | Pumpkinseed* | |
| Stonecat | *Noturus flavus* | Bluegill* | |
| American eel | *Anguilla rostrata* | Smallmouth bass | |
| Trout-perch | *Percopsis omiscomaycus* | Largemouth bass* | |
| White perch | | White crappie* | *Pomoxis annularis* |
| White bass | | Black crappie* | *Pomoxis nigromaculatus* |
| Freshwater drum | | Log perch | *Percina caprodes* |
| Rainbow trout | *Salmo gairdneri* | Yellow perch | |
| Goldfish* | | Walleye | |
| Carp* | | | |
| Carp x goldfish* | | | |

*Represents fish entirely or largely dependent on aquatic vegetation or marsh habitats (Johnson 1989).

Concern for threatened and endangered darter and cyprinid species is of particular interest as their distributions tend to be scattered patches and they exist in local areas in abundances ranging from low to high. With the presence of exotic species such as the round goby, localized distributions of these species may be severely impacted due to the aggressive, predacious nature of the goby, and the fact that goby have preyed directly on darter species in controlled environments (Jude et al. 1995). The round goby may quickly extirpate a small, defined local populations of small species due to their ability to spawn multiple times in a season allowing them to become very abundant in a short period of time (Jude 1997).

A low abundance of the nuisance exotic round goby was captured during sampling. The round goby was first discovered in the St. Clair River in 1990 and had expanded its range downstream into the Detroit River by 1993. It aggressively competes with native species for food and habitat and is a potential vector for contaminant transfer from contaminated zebra mussels, a popular food item, to sport fish (Endicott et al. 1998, Bruner et al. 1994). Given the presence of the round goby in refuge waters and its associated problems, it was necessary to document the fish community resources of the refuge. Although other invaders were not captured, the potential exists for their establishment due to

the high amount of shipping traffic in this connecting waterway. Round goby, Eurasian ruffe, and a variety of other aquatic nuisance species have been introduced into the Great Lakes through the dumping of contaminated ballast water from ocean going ships. The abundance of round goby was relatively low in this area despite the large amount of riprap, which is preferred habitat (Jude 1997). They are most effective sampled with impoundment gear and angling rather than electrofishing.

***Management Recommendations***

For cost effective future sampling in refuge waters, nighttime electrofishing in May is recommended to reflect the abundance and diversity of species present. All species were captured with electrofishing gear in the present study (trap net gear captured only 66 % of the species present). Of those species not captured in trapnets, the majority (60%) were small in size such as representatives of the minnow family. These fish likely escaped capture due to large mesh size. The greatest diversity and abundance of species were captured in May and sturgeon are present and active at this time in the river as well.

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## LITERATURE CITED

Bruner, K.A., S.W. Fisher, and P.F. Landrum. 1994. The role of the zebra mussel, Dreissena polymorpha, in contaminant cycling: II. Zebra mussel contaminant accumulation from algae and suspended particles, and transfer to the benthic invertebrate, *Gammarus fasciatus*. J. Great Lakes Res. 20(4): 735-750.

Endicott, D., R. G. Kreiss Jr., L. Mackelburg, and D. Kandt. 1998. Modeling PCB bioaccumulation by the zebra mussel (*Dreissena polymorpha*) in Saginaw Bay, Lake Huron. J. Great lakes Res. 24 (2): 411-426.

Goodyear, C.D., T.A. Edsall, D.M. Ormsby Dempsey, G.D. Moss, and P.E. Polanski. 1982. Atlas of the spawning and nursery areas of Great Lakes fishes. Volume one: Spawning and nursery areas of Great Lakes fishes: A summary by geographic area. U.S. Fish and Wildlife Service, Washington, DC FWS/OBS-82/52.

Goodyear, C.D., T.A. Edsall, D.M. Ormsby Dempsey, G.D. Moss, and P.E. Polanski. 1982. Atlas of the spawning and nursery areas of Great Lakes fishes. Volume eight: Detroit River. U.S. Fish and Wildlife Service, Washington, DC FWS/OBS-82/52.

Goodyear, C.D., T.A. Edsall, D.M. Ormsby Dempsey, G.D. Moss, and P.E. Polanski. 1982. Atlas of the spawning and nursery areas of Great Lakes fishes. Volume thirteen: Reproductive characteristics of Great Lakes Fishes. U.S. Fish and Wildlife Service, Washington, DC FWS/OBS-82/52.

Hass, R.C., W.C. Bryant, K.D. Smith, and A.J. Nuhfer. 1985. Movement and harvest of fish in Lake St. Clair, St. Clair River, and Detroit River. Michigan DNR Fisheries Division, Winter Navigation Study Final Report. 610 pp.

Johnson, D.L. 1989. Lake Erie wetlands: fisheries considerations. In Lake Erie Estuarine Systems: Issues, resources, status, and management, ed. K.A. Krieger, pp. 257-274. NOAA Estuary-of-the-Month Seminar Services No. 14. NOAA Estuarine Programs Office, Washington, D.C.

Jude, D.J. 1997. Round gobies: cyberfish of the third millennium. Great Lakes Res. Rev. 3(1): 27-34.

Jude, D.J., J. Janssen, and G. Crawford. 1995. Ecology, distribution, and impact of the newly introduced round and tubenose gobies on the biota of the St. Clair and Detroit Rivers. *In* The Lake Huron ecosystem: ecology, fisheries, and management. *Edited by* M. Munawar, T. Edsall, and J. Leach. Ecovision World Monograph Series. S.P.B. Academic Publishing, Amsterdam, The Netherlands. Pp. 447-460.

Jude, D.J. R.H. Reider, and G.R. Smith. 1992. Establishment of Gobiidae in the Great Lakes basin. Canadian Journal of Fisheries and Aquatic Sciences 49: 416-421.

Latta, C. 1994. Status of some of the endangered and threatened fishes of Michigan in 1994. Report prepared for Michigan DNR, Natural Heritage Program, Wildlife Division. Unpublished report.

MacInnis, A.J. and L.D. Corkum. 2000a. Fecundity and reproductive season of the round goby *Neogobius melanostomus* in the Upper Detroit River. Trans. Am. Fish. Soc. 129: 136-144.

MacInnis, A.J. and L.D. Corkum. 2000b. Age and growth of round goby *Neogobius melanostomus* in the Upper Detroit River. Trans. Am. Fish. Soc. 129: 852-858.

MDNR (Michigan Department of Natural Resources). 1994. Michigan's special animals.

Refuge Management Information System. 1998. Station purposes, mission, goals, and objectives for Wyandotte NWR. U.S. Fish & Wildlife Service. December 8, 1998.

Scott, W.B. and E.J. Crossman. 1973. Freshwater fishes of Canada. Fisheries Research Board of Canada Bulletin 184, Ottawa, Canada.